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09/817,534	03/26/2001	Lee W. Atkinson	COMP:0203	6811

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EXAMINER	
PEREZ DAPLE, AARON C	

ART UNIT	PAPER NUMBER
2154	

DATE MAILED: 10/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/817,534	ATKINSON, LEE W.	
	Examiner	Art Unit	
	Aaron C Perez-Daple	2154	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 September 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *46-63,65-80 and 82-90* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *46-63,65-80 and 82-90* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This Action is in response to RCE filed 910/04 and Amendment filed 9/21/04, which have been fully considered.

2. Claims 46-63, 65-80 and 82-90 are presented for examination.

3. This Action is non-Final.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. **Claims 63, 66, 67, 77-80, 82, 83, 85-87, 89 and 90** are rejected under 35 U.S.C. 102(e) as anticipated by Bausch et al. (US 6,304,824 B1) (hereinafter Bausch).

6. As for claims 63 , 77 and 86, Bausch discloses a method and system comprising:

an integrated circuit (integrated circuit 10, Fig. 3);

a power supply coupled to the integrated circuit (power supply 40, Fig. 3; col. 7, line 59-col. 8, line 9, "Fig. 6C illustrates...circuit 32 implemented.");

at least one sensor configured to obtain an indicator of at least one non-temperature operating parameter of the integrated circuit (channel mobility sensor 20, Fig. 3); and

a controller coupled to the at least sensor and the power supply, wherein the controller is configured to analyze the operational relationship between the at least one non-temperature

operating parameter, an operating voltage, and an operating frequency to provide the power supply with a target voltage that substantially minimizes power consumption and that simultaneously maintains a substantially constant operating frequency of the integrated circuit (col. 4, lines 59-67, "The exemplary low power...region of operation."; The "code" of claim 86 is considered inherent to the DSP and microcontroller of col. 7, lines 54-58, "This digital output...to the IC 11.").

The limitation of *maintaining a substantially constant operating frequency* is inherent to Bausch, as evidenced by Wakefield (US 3,793,721) (hereinafter Wakefield). As laid out in the Advisory Action mailed 8/6/04, Wakefield teaches an equation specifying the relationship between frequency and channel current in col. 1, lines 37-50. The Examiner notes that, for a given IC circuit used in the invention of Bausch, the drain voltage and channel length will be fixed. Therefore, the frequency is directly proportional to the channel current, and maintaining a substantially constant operating frequency is equivalent to maintaining a substantially constant channel current. Since Bausch teaches maintaining a substantially constant channel current (col. 4, lines 39-65), Bausch inherently teaches maintaining a substantially constant operating frequently.

7. As for claim 66, Bausch discloses the method of claim 63, wherein analyzing the operational relationship comprises solving an equation characterizing power consumption, voltage, and frequency of the integrated circuit (col. 3, lines 29-50, "Thus, the individual...operating temperature range."; col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly.").

8. As for claim 67, Bausch discloses the method of claim 63, comprising adjusting the power supply to provide the target voltage to the integrated circuit (col. 3, lines 40-42, "Therefore, to keep...adjusted to compensate.").

9. As for claim 78, Bausch discloses the method of claim 77, wherein the integrated circuit comprises a processor (microprocessor 10B, Fig. 4).

10. As for claim 79, Bausch discloses the method of claim 77, comprising a computer system (Fig. 4).

11. As for claim 80, Bausch discloses the method of claim 77, wherein the at least one sensor comprises a temperature sensor configured to obtain an indicator of operating temperature of the integrated circuit (col. 7, lines 14-17, "Fig. 6A illustrates...in control circuit 30.").

12. As for claim 82, Bausch discloses the method of claim 77, wherein the controller comprises a programmable logic unit (col. 7, lines 54-58, "This digital output...to the IC 11.").

13. As for claim 83, Bausch discloses the method of claim 77, wherein the controller comprises code stored on a tangible medium (considered inherent to digital signal processor 332, Fig. 6B; col. 7, lines 54-58, "This digital output...to the IC 11.")

14. As for claim 85, Bausch discloses the method of claim 77, wherein the controller comprises a characteristic equation of the integrated circuit that can be solved to obtain the target voltage (col. 3, lines 29-50, "Thus, the individual...operating temperature range."; col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly.").

15. As for claim 87, Bausch discloses the method of claim 86, wherein the code is configured to evaluate a plurality of sensed operating parameters for the integrated circuit, including the

non-temperature operating parameter and an operating temperature of the integrated circuit (col. 3, lines 29-50, "Thus, the individual...operating temperature range."; col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly.").

16. As for claim 89, Bausch discloses the method of claim 86, wherein the code is configured to solve an equation characterizing power consumption, voltage, and frequency of the integrated circuit to obtain the target voltage (col. 3, lines 29-50, "Thus, the individual...operating temperature range."; col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly.").

17. As for claim 90, Bausch discloses the method of claim 86, wherein the code is disposed on a computer system (Figs. 4 and 5).

Claim Rejections - 35 USC § 103

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

19. **Claims 46-50, 52-59, 61, 62, 68-72, and 74-76** are rejected under 35 U.S.C. 103(a) as being unpatentable over Bausch et al. (US 6,304,824 B1) (hereinafter Bausch) in view of Alexander et al. (US 5,420,808) (hereinafter Alexander).

20. As for claims 46 and 48, Bausch explicitly discloses obtaining a plurality of operating parameters including operating temperature of an integrated circuit (See col. 3, lines 40-50, "Therefore, to keep the...operating temperature range," col. 4, lines 59-67, "The exemplary

low power...region of operation," and col. 7, lines 14-17, "Fig. 6A illustrates...in control circuit 30.");

analyzing the plurality of operating parameters to provide a target voltage that substantially minimizes power consumption and that simultaneously maintains a substantially constant operating frequency (col. 4, lines 59-67, "The exemplary low power...region of operation."); and

adjusting a power supply coupled to the integrated circuit from an existing voltage to the target voltage (col. 3, lines 47-51, "The monitored parameter...operating temperature range.").

Although obvious to one of ordinary skill, Bausch does not explicitly disclose obtaining the operating load of an integrated circuit by detecting a power load variation of the integrated circuit. Alexander discloses obtaining the operating load of an integrated circuit by detecting a power load variation of the integrated circuit for the purpose of switching to a low power mode (col. 2, line 64 - col. 3, line 8, "In the exemplary embodiment...at the same time."). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Bausch by obtaining the operating load of the integrated circuit by detecting a power load variation of the integrated circuit in order to switch to a low power mode, as taught by Alexander.

The limitation of *maintaining a substantially constant operating frequency* is inherent to Bausch, as evidenced by Wakefield (US 3,793,721) (hereinafter Wakefield). As laid out in the Advisory Action mailed 8/6/04, Wakefield teaches an equation specifying the relationship between frequency and channel current in col. 1, lines 37-50. The Examiner

notes that, for a given IC circuit used in the invention of Bausch, the drain voltage and channel length will be fixed. Therefore, the frequency is directly proportional to the channel current, and maintaining a substantially constant operating frequency is equivalent to maintaining a substantially constant channel current. Since Bausch teaches maintaining a substantially constant channel current (col. 4, lines 39-65), Bausch inherently teaches maintaining a substantially constant operating frequently.

21. As for claim 47, Bausch discloses the method of claim 46 wherein obtaining the plurality of operating parameters comprises sensing at least one of operating temperature, operating load, operating voltage, operating frequency, and resistance of the integrated circuit (col. 7, lines 14-17, "Fig. 6A illustrates...in control circuit 30.").

22. As for claim 49, Bausch discloses the method of claim 46, wherein obtaining the plurality of operating parameters comprises detecting an operating temperature variation of the integrated circuit (col. 7, lines 14-17, "Fig. 6A illustrates...in control circuit 30.").

23. As for claim 50, Bausch discloses the method of claim 46, wherein obtaining the plurality of operating parameters comprises sensing at least one operating parameter of a processor (col. 3, lines 40-50, "Therefore, to keep the...operating temperature range.").

24. As for claim 52, Bausch discloses the method of claim 46, wherein analyzing the plurality of operating parameters comprises solving an equation characteristic of the integrated circuit to obtain the target voltage based on at least one of the plurality of operating parameters (col. 3, lines 29-50, "Thus, the individual...operating temperature range."; col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly.").

25. As for claim 53, Bausch discloses the method of claim 52, wherein analyzing the plurality of operating parameters comprises calculating the target voltage from the equation having an inverse relationship between operating temperature and operating frequency and having a direct relationship between operating voltage and operating frequency (The relationship between the variables is inherent to the physics of the device, as further described by Bausch in cols. 3-4.; col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly.").

26. As for claim 54, Bausch discloses the method of claim 46, wherein adjusting the power supply comprises providing a control signal configured to adjust the power supply to the target voltage (col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly.").

27. As for claim 55, Bausch discloses the method of claim 46, comprising programming a programmable power supply (col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly.").

28. As for claims 56, 68 and 70 Bausch discloses a method for controlling operational parameters of a computer system comprising:

sensing an operating temperature of an integrated circuit coupled to a power supply (col. 7, lines 14-17, "Fig. 6A illustrates...control circuit 30."; Fig. 3);

analyzing an operational relationship between the operating temperature, operating parameters, an operating voltage, and an operating frequency to provide a target voltage that substantially reduces power consumption without substantially altering operating frequency of the integrated circuit (col. 4, lines 59-67, "The exemplary low power...region of operation.").

Although obvious to one of ordinary skill, Bausch does not explicitly disclose detecting another operating parameter of the integrated circuit. Alexander discloses detecting another parameter of the integrated circuit for the purpose of switching to a low power mode (col. 2, line 64 - col. 3, line8, "In the exemplary...at the same time."). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Bausch by detecting another parameter indicative of existing operating load of the integrated circuit for the purpose of switching to a low power mode, as taught by Alexander.

29. As for claims 57, although obvious to one of ordinary skill in the art, Bausch does not explicitly disclose detecting another operating parameter of the integrated circuit wherein the operating parameter comprises an indicator of existing operating load. Alexander discloses detecting an operating parameter of an integrated circuit wherein the operating parameter comprises an indicator of existing operating load for the purpose of switching to a low power mode (col. 2, line 64 - col. 3, line8, "In the exemplary...at the same time."). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Bausch by detecting another parameter indicative of existing operating load of the integrated circuit for the purpose of switching to a low power mode, as taught by Alexander.

30. As for claim 58, Bausch discloses the method of claim 56, wherein detecting the operating parameter comprises obtaining an indicator of existing operating voltage (Since the voltage is commanded by the control system of Bausch, the system inherently includes an indicator of the voltage. See Fig. 3.).

31. As for claim 59, although obvious to one of ordinary skill in the art, Bausch does not explicitly disclose detecting another operating parameter of the integrated circuit wherein the

operating parameter comprises an indicator of existing operating frequency. Alexander discloses detecting an operating parameter of an integrated circuit wherein the operating parameter comprises an indicator of existing operating frequency for the purpose of switching to a low power mode (col. 2, line 64 - col. 3, line8, "In the exemplary...at the same time."). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Bausch by detecting another parameter indicative of existing operating frequency of the integrated circuit for the purpose of switching to a low power mode, as taught by Alexander.

32. As for claim 61, Bausch discloses the method of claim 56, wherein analyzing the operational relationship comprises solving an equation having an inverse relationship between the operating temperature and operating frequency and having a direct relationship between operating voltage and operating frequency (The relationship between the variables is inherent to the physics of the device, as further described by Bausch in cols. 3-4.; col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly.").

33. As for claim 62, Bausch discloses the method of claim 56, comprising providing feedback to the power supply to adjust output of the power supply to provide the target voltage to the integrated circuit (col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly.").

34. As for claim 69, Bausch discloses the method of claim 68, wherein providing the control system comprises providing a power supply controller configured to adjust a power supply coupled to the integrated circuit from an existing voltage to the target voltage (col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly."; Fig. 3).

35. As for claim 71, Bausch discloses the method of claim 68, comprising providing a logic unit configured to determine the target voltage (control circuit 30, Fig. 3).

36. As for claim 72, Bausch discloses the method of claim 68, comprising providing code configured to determine the target voltage (considered inherent to DSP or microprocessor, col. 7, lines 54-58, "This digital output...to the IC 11.").

37. As for claim 74, Bausch discloses the method of claim 68, comprising providing a programmable power supply responsive to the control circuit (col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly."; Fig. 3).

38. As for claim 75, Bausch discloses the method of claim 68, comprising providing an integrated circuit having the control system (integrated circuit 10, Fig. 3).

39. As for claim 76, Bausch discloses the method of claim 74, comprising providing a computer having the integrated circuit (Figs. 4 and 5).

40. **Claims 51, 60 and 73** are rejected under 35 U.S.C. 103(a) as being unpatentable over Bausch in view of Alexander and in further view of Ginzel et al. (US 5,347,260) (hereinafter Ginzel).

41. As for claims 51, 60, and 73, Bausch discloses analyzing the plurality of operating parameters to set a target voltage (col. 4, lines 59-67, "The exemplary low power...region of operation."). However, Bausch does not specifically disclose accessing a look-up table. It is well-known and expected in the controller arts to access a look-up table for the purpose of reducing processing requirements and achieving faster system response time. Ginzel teaches a control system having a sensor which uses a look-up table to store values in place of an equation for the purpose of reducing processing requirements (col. 36-38, "Alternatively, a

look-up table...the equation."). It would have been obvious to one of ordinary skill in the art to modify the teachings of Bausch and Alexander by accessing a look-up table having voltages corresponding to at least one of a plurality of operating parameters because this would prevent the need to use an equation and reduce processing requirements, as taught by Ginzel. See also cited reference US 6,476,716 B1.

42. **Claims 65, 84 and 88** are rejected under 35 U.S.C. 103(a) as being unpatentable over Bausch in view of Ginzel.

43. As for claims 65, 84 and 88, Bausch discloses analyzing the plurality of operating parameters to set a target voltage (col. 4, lines 59-67, "The exemplary low power...region of operation."). However, Bausch does not specifically disclose accessing a look-up table. It is well-known and expected in the art to access a look-up table for the purpose of reducing processing requirements and achieving faster system response time. Ginzel, for example, teaches a control system having a sensor which uses a look-up table to store values in place of an equation for the purpose of reducing processing requirements (col. 36-38, "Alternatively, a look-up table...the equation."). It would have been obvious to one of ordinary skill in the art to modify the teachings of Bausch and Alexander by accessing a look-up table having voltages corresponding to at least one of a plurality of operating parameters because this would prevent the need to use an equation and reduce processing requirements, as taught by Ginzel. See also cited reference US 6,476,716 B1.

Response to Arguments

44. Applicant's arguments filed 9/10/04 have been fully considered but they are not persuasive.

45. First, with respect to claims 46, 56 and 68, Applicant asserts that Bausch fails to teach or suggest *maintaining a substantially constant operating frequency* while substantially minimizing power consumption. The Examiner respectfully disagrees. Specifically, the Applicant disagrees with the Examiner's previous assertion that "maintaining a substantially constant channel current is the same as maintaining a substantially constant operating frequency." As laid out in the Advisory Action mailed 8/6/04, the Examiner has provided multiple references demonstrating the inherency of this limitation to Bausch. See the rejection under 103(a) above for a specific teaching of the inherency of this limitation.

Second, with respect to claims 46, 56 and 68, Applicant asserts that Alexander teaches away from Bausch. The Examiner respectfully disagrees. As noted by Applicant on pages 11 and 12 of the Remarks filed 9/10/04, both Alexander and Bausch are directed towards solving the same problem of regulating power consumption in an integrated circuit (IC). The cited passage of Alexander (col. 2, line 64 – col. 3, line) recites, in part:

> According to some previous techniques, an entire microprocessor can be placed in a low power mode by ***disabling power or*** by slowing clock signal transitions to the entire microprocessor, normally in response to a specified time elapsing without sensing processing activity by the microprocessor. (emphasis added)

As shown in this passage, even though a specific embodiment of Alexander's invention may be directed towards minimizing power consumption by manipulating the clock frequency, Alexander also clearly anticipates varying the power supply (e.g. voltage) in order to

accomplish the same objective. Moreover, Alexander is relied on only to teach that it is known in the art to regulate power consumption based on an indication of operating load, *irrespective of the particular regulating method used.* Therefore, even assuming without admitting that Alexander does not teach varying the power supply as an alternative to manipulating the clock frequency, Alexander is not required to teach this limitation in order to suggest modifying Bausch by detecting operating load. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Bausch by obtaining the operating load of the integrated circuit by detecting a power load variation of the integrated circuit in order to switch to a low power mode, as taught by Alexander.

For all of these reasons, claims 46, 56 and 68 are properly rejected under 35 U.S.C. 103(a) as anticipated by Bausch in view of Alexander.

46. With respect to claims 63, 77 and 86, first, the claims do not recite the limitation of obtaining the operating load of the integrated circuit, therefore this argument is moot. Second, Bausch teaches maintaining a substantially constant operating frequency for the same reasons cited with respect to claims 46, 56 and 68 above. Therefore, claims 63, 77 and 86 are properly rejected under 35 U.S.C. 102(e) as anticipated by Bausch.

47. Independent claims 46, 56, 63, 68, 77 and 86 have been shown to properly rejected above. Therefore, dependent claims 47-55, 57-62, 64-67, 69-75, 78-85 and 87-90 are properly rejected for the same reasons.

Conclusion

48. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron C Perez-Daple whose telephone number is (703) 305-4897. The examiner can normally be reached on 9am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Follansbee can be reached on (703) 305-8498. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

10/18/04

Aaron Perez-Daple

N. Ellsworth